



## Research & Development Facilities

### Alternative Fuel Laboratory

#### Bio-Diesel Plant:



#### Technical Specification:

**Trans-etherification Reactor:** S.S 304, 15 Liters volume Trans-esterification reactor with S.S Electric heating coil of 0.5KW, Thermo well with thermometer, S.S liquid flow indicator, Reaction view port, Reaction pressure indicator, Charge/Loading port, Polypropylene circulation pump for liquid transfer and Uniform mixing Reaction test cork, safety valve, etc.

**Washing and drying vessel:** Washing inlet and outlet and drain valves and drying vessel in SS 304 with 15 liters volume Bio-Diesel with top lid and bottom cone. The vessel is fitted with 0.5KW SS heating-coil, thermo meter.

**M.S Structure:** The structure is a angular structure to mount reactor and equipment's. This structure is specially designed in the form of a portable skid. If required; the structure can be transported to different sites.

**Reflux Condenser:** S.S 304 Vapor condensing tubes in M.S Body, water inlet & outlet, vapor inlet & condensate outlet with control valve and pipelines like Final vent, Pressure indicating gauge, Vapor inlet, Water inlet & outlet Condensate outlet



**Hot water tank:** Hot water tank with 20 liters holding capacity equipped with 1.5KW heating-coil, water inlet & outlet, over flow, drain control valves, temperature indicating thermometer mounted on a M.S Stand connected with flexible washing shower

**Electric control panel:** A traditional electric control panel with single phase/ heating system equipped with indicators, volts and amps meter



**Oil Expeller:** 5-10 Kgs per hour oil expeller along with bag filter and compatible accessories.



**Bio-fuel Titration Kit:** B-Beaker low form 250ml Boro lab, B-Beaker lowform 100ml Boro lab, F-Conical flask 250ml Boro lab, Conical Flask 100 ml, T-Thermometer 10° C TO 110° C, H-





Hydro meter Range: 0.7 TO 1.0, J-Measuring jug 2ltr Poly Propylene, J-Measuring jar 500 ml Poly Propylene, Test tube 25x150 mm (3 Nos), Burette stand with clips, P-Phenolphthalein solution 125ml P40871, I-Isopropyl alcohol 500ml. I11129, Indicator paper ph 0-14Nice I-40656, Heating mantel-250 ml, Graduated glass measuring cylinder 10 ml.

Bio Diesel Testing Lab Equipments as per BIS IS15607:2005: Viscometer bath with Viscometer, Pensky-Martin Flash point Apparatus Digital, Copper Strip Bath with Bomb with Standard Strip, Top Pan Balance – 300 gm capacity, sensitivity 0.1 gm, Supporting Literature.

### **The computerized VCR Engine set-up:**




### **Technical Specification and Details:**

1Cylinder, 4 Stroke, Multi Fuel , Kirloskar TV1, constant speed, Power 5.2 kw @ 1500 rpm, 661cc The is a single cylinder, four stroke, VCR (Variable Compression Ratio) Diesel Engine. The set up has stand-alone panel box consisting of air box, twin fuel tank for duel fuel test, manometer, fuel measuring unit, transmitters for air and fuel flow measurements, process indicator and piezo powering unit. Rota meters are provided for ooling water and calorimeter water flow measurement. The setup enables study of VCR engine performance for both Diesel and Petrol. Single cylinder four stroke, water cooled, Kirloskar engine modified to VCR Diesel. The compression ratio can be changed without stopping the engine and without altering the combustion chamber geometry by specially designed tilting cylinder block arrangement.

**Features:**•Changing CR without stopping the engine

• Diesel operation • Diesel injection point advancement

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			<b>R&amp;D Cell</b>
			<b>Facilities</b>
			<b>AY:2021-22</b>

• Electric starting arrangement •  $P\theta$ -PV plots, IP, IMEP, FP indication • Combustion analysis Dynamometer :Type eddy current, water cooled, with loading unit Propeller shaft With universal joints Air box M S fabricated with orifice meter and manometer Fuel tank Capacity 15 lit, Type: Dual compartment, with fuel metering pipe of glass Calorimeter Type Pipe in pipe Piezo sensor Combustion: Range 350BA, Diesel line: Range 350 BAR, with low noise cable Crank angle sensor Resolution 1 Deg, Speed 5500 RPM with TDC pulse.

Data acquisition device NI USB-6210, 16-bit, 250KS/s.

Temperature sensor Type RTD, PT100 and thermocouple, Type K Temperature transmitter Type two wire, Input RTD PT100, Range 0–100 Deg C, Output 4–20 mA and Type two wire, Input Thermocouple, Load sensor Load cell, type strain gauge, range 0-50 Kg Fuel flow transmitter DP transmitter, Range 0-500 mm WC

Air flow transmitter Pressure transmitter, Range (-) 250 mm WC Software "Enginesoft" Engine performance analysis software Rotameter Engine cooling 40-400 LPH; Calorimeter 25-250 LPH Pump Type Monoblock

**Software:** EngineSoft is Labview based for engine performance monitoring system. EngineSoft can serve most of the engine testing application needs including monitoring, reporting, data entry, data logging. The software evaluates power, efficiencies, fuel consumption and heat release. Various graphs are obtained at different operating condition. While on line testing of the engine in RUN mode necessary signals are scanned, stored and presented in graph. Stored data file is accessed to view the data graphical and tabular formats. The data in excel format can be used for further analysis.

**Instrumentation:** Product is supplied with best quality instruments. The dynamometer is SAJ, Pune make. The components like Combustion pressure sensor (PCB Piezotronics, USA), Crank angle sensor (Kubler, Germany), Fuel flow transmitter (Yokogawa, Japan), Temperature & pressure transmitters (Wika, Germany),

High speed data acquisition device (National instruments, USA) are of MNC grades

### Diesel Smoke meter:





Measurement range: Absorption 0-99.99 m<sup>-1</sup>, Opacity 0-100%. Resolution: Absorption 0.01m<sup>-1</sup> Opacity 0.1% Better than +/- 0.1m<sup>-1</sup>. Operating temperature: 0°C-50°C. Calibration: Automatic Linearity Check: Around 50% of measurement range at the press of key/lever. Measurement length: 430mm +/- 5mm, Dimension: 600x260x370mm. (W X H X D). Weight: Approximately 22 Kg s. Power supply: AC 190-240V AC 50. DC 11 V-36V DC within built inverter. Printer: Built in impact printer with provision for multiple print out. Computer interface: RS 232 serial interface to operate on PC for communicating data.

Display: Digital, Clear and visible in all natural conditions. Approval: A.R.A.I. Pune. Results compatibility: Measurement results are fully compatible with Hatridge Smoke Units (HSU). Range/Accuracy/Resolution: The Device should have Calibration for low and high speed with indication. The device should calibrate before each free acceleration test.

### Exhaust Gas Analyzer:



### Technical Specification and Details:

"MARS" make Microprocessor based Multi Gas Analyser for CO,CO<sub>2</sub>,O<sub>2</sub>,NO<sub>x</sub> & HC model MN-05 with standard accessories with printer Operating System: PIC- Micro Controller Display: LCD Display

Interface: RS-232 & RS-485 Power Supply: 230v AC 50 Hz 12 v DC (Optional)

Dimensions: 450 mm X 300 mm X 120 mm Approx. Weight: 5 kg Approx.

Measurements:

1. CO (Range: 0 – 9.99% vol Resolution: 0.001% vol)
2. HC (Range: 0 – 15000 ppm Resolution: 1 ppm)
3. CO<sub>2</sub> (Range: 0 – 20% vol Resolution: 0.01% vol)
4. O<sub>2</sub> (Range: 0 – 25% vol Resolution: 0.1% vol)
5. NO<sub>x</sub> (Range: 0 – 5000 ppm Resolution: 1 ppm)
6. Engine RPM (Range: 500 – 6000 rpm Resolution: 1 rpm)
7. Oil Temperature (Range: 0 – 150° C Resolution: 1°C)
8. Lambda (λ) (Range: 0.200 – 2.000% Resolution: 0.001)

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## Aerodynamics Laboratory



- **Technical Specification:** Type : Open Type Wind Tunnel.  
Test Section : 300 X 300 X 1000mm  
Blower Fan/Axial fan : 5 Blades Aluminum Dia Cast Fan.  
Motor : 3 H.P. AC Induction Motor. 2880 Rpm., 440 V / 15 Amp.  
Controller : LG Make / Delta Make. Wind Speed in Test Section: 30 M/sec by Suitable Blower Fan/Axialfan.  
Duct : Manufactured Out Of Fiber Glass With Inside Smooth Finish .  
Length Of Tunnel : 4.2 Meter Approx.  
Air Length : 9.5 Meter.  
Contraction Ratio : 9:1
- **Instrumentation :** Two Component Digital Force Indicator with Strain Gauge Balance.
- **Measuring Capacity :** Lift Force Up To 25 Kg. Drag Force Up To 10kg.
- **Multitube Manometer :** Acrylic/Galss 400mm Height, 500mm Width (approx) 12 Tubes, 6mm, Dia 0 - 45 Inclination With Vertical Axis.
- **Micromanometer :** 50mm
- **MicropitotTube :** 15cm. Long Along With Micrometer 0-25mm.
- **Anemometer :** 10-30 M/sec.



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Facilities

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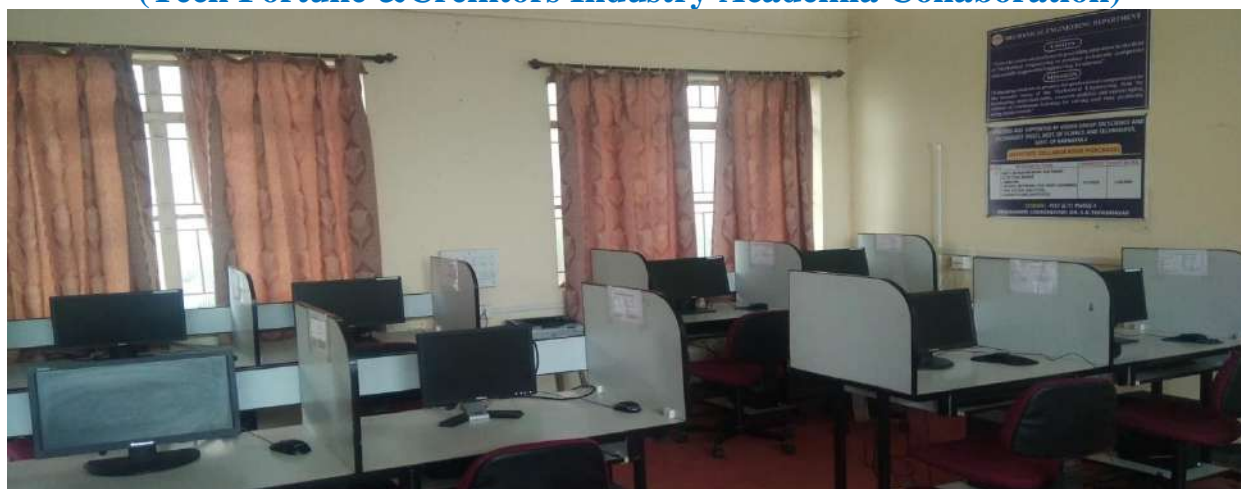
## Project & Assembly Laboratory







## Simulation & Coding Laboratory and Robotics & Automation Lab/Idea Lab (Tech Fortune & Creintors Industry Academia Collaboration)



Aurdino Kits & Sci lab, Origin & Graphers software  
MAT LAB R2018b-Basic Software with MAT Lab Tool Boxes: 1. Simulink-MAT LAB 2. Neural Network (for deep learning) 3. Partial Differential Equation 4. Curve Fitting











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### Skill Development Laboratory (BOSCH Industry-Academia Collaboration)



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## **Research Computerized VCR Engine Setup: Open ECU connected, Single Cylinder CRDI with EGR Multi fuel combustion Arrangements.**



### **Technical Specifications:**

Product: CRDI-VCR Engine test (Computerized) Engine: Make Kirloskar, Single cylinder, 4 stroke, water cooled, stroke 110 mm, bore 87.5 mm, 661 cc. Power 3.5 KW, 1500 rpm, CR range 12-18., Dynamometer: Type eddy current, water cooled with loading unit, Propeller shaft: Make Hindustan Hardy, with universal joints, ECU: Model Nira i7r (with solenoid injector driver) with programmable ECU software and Calibration cable, Common rail: With pressure sensor and pressure regulating valve, EGR: SS, Water cooled, Injector: Type Solenoid driven, Piezosensor: Make PCB USA. Combustion: Range 350 Bar with low noise cable, Crank angle sensor: Make Kubler Germany, Resolution 1 Deg, Speed 5500 RPM with TDC pulse., Data acquisition device: Make NI Instrument USA, NI USB-6210, 16-bit, 250kS/s., Temperature sensor: Make Radix, Type RTD, PT100 and Thermocouple, Type K, Temperature: Make ABUSTEK USA, Type two wire, Input RTD PT100, Range 0-100 DegC, Transmitter: Output 4-20 mA and Type two wire, Input Thermocouple., Load sensor: Make VPG Sensotronics, Load cell, type strain gauge, range 0-50 Kg, Fuel flow transmitter: Make Yokogawa Japan, DP transmitter, Range 0-500 mm WC, Fuel tank: Capacity 15 lit, Type: Dual compartment, with fuel metering pipe of glass, Calorimeter: Pipe in pipe, Air flow transmitter: Make Wika Germany, Pressure transmitter, Range (-) 250 mm WC, Software: "Engine soft" Engine performance analysis software, Rotameter: Make Eureka, Engine cooling 40-400 LPH, Calorimeter 25-250 LPH, Pump: Make Kirloskar, Type Monoblock.



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## VTU – ALTEM DESIGN & ANALYSIS LABORATORY



### List of Application Soft wares

S. No.	MSC Software	Short Description of Visualizing Engineering Software Package
1	MSC Nastran	Multidisciplinary Industry Standard Structural Analysis Simulation
2	Patran	Comprehensive Pre- and Post- Processing Environment Finite Element Modeling
3	MSC Apex	Unified CAE Environment for Virtual Product Development
4	Marc Mentat	Advanced Nonlinear Simulation Solution
5	Adams	Advanced Multi-Body Dynamics Simulation Solution
6	Digimat	Nonlinear Multi Scale Material and Structure Modeling Platform
7	Digimat –AM	Application for simulation of Additive Manufacturing Process of Polymer Parts
8	Easy5	Multi-Domain Modeling of Controls & System Solution
9	scFLOW	New Generation CFD Software with Multi-Physics
10	Dytran	Explicit Dynamics and Fluid Structure Interaction
11	Simufact Additive	Simulation Tool for Distortion Prediction in Powder Bed Additive Manufacturing
12	Simufact Forming	Simulate Metal Forming, Heat Treatment & Mechanical Joining Process
13	Simufact Welding	Simulate Complex Welding Process, Predicts Distortions & Stress Relief
14	Sinda	Industry Proven Advanced Thermal Simulation Solution
15	MSC Fatigue	Predict Fatigue Life, Durability and Damage Predictions (within Patran)


















# Visvesvaraya Technological University

## Jnana Sangama, Belagavi-590018





### VTU-CONSORTIUM

#### Subscription of E-Resources for the year 2021-22

SL NO	PUBLISHERS	SUBJECT CATEGORY	RESOURCE COVERAGE	NO. OF RESOURCES	CONTACT DETAILS	SUBSCRIPTION PERIOD
1.	<p>Elsevier</p> <p><a href="http://www.sciencedirect.com">www.sciencedirect.com</a></p> 	Engineering + CS + EE + ME + EC and CV	<p>Artificial Intelligence-22</p> <p>Computer Graphics and Computer-Aided Design-19</p> <p>Computer Networks and Communications-29</p> <p>Computer Vision and Pattern Recognition-10</p> <p>Hardware and Architecture-20</p> <p>Information Systems-28</p> <p>Signal Processing-13</p> <p>Aerospace Engineering-5</p> <p>Biomedical Engineering-16</p> <p>Civil and Structural Engineering-35</p> <p>Computational Mechanics-11</p> <p>Electrical and Electronic Engineering-33</p> <p>Mechanical Engineering-36</p> <p>Ocean Engineering-6</p> <p>Safety, Risk, Reliability and Quality-13</p> <p><b>(Back Issues from 2010)</b></p>	296 Journals	<p><b>Nikhil Bhalerao</b></p> <p>7428699374</p> <p>n.bhalerao@elsevier.com</p>	01-05-2021 to 30-04-2022
2.	<p>IEEE Proceedings Order Plan (POP)</p> <p><a href="https://ieeexplore.ieee.org">https://ieeexplore.ieee.org</a></p>  <p>Advancing Technology for Humanity</p> 	The core collection of IEEE conference proceedings from approximately 100 of IEEE's most important conferences. Full-text access with a backfile to 2010.	<ul style="list-style-type: none"> <li>• Aerospace and Defense</li> <li>• Biometrics</li> <li>• Computer Hardware and Software</li> <li>• Cyber Security</li> <li>• Electronics</li> <li>• Internet of Things (IoT)</li> <li>• Medical Devices</li> <li>• Nanotechnology</li> <li>• Optics</li> <li>• Power Engineering</li> <li>• Robotics</li> <li>• Semiconductors</li> <li>• Smart Grid</li> <li>• Telecommunications</li> <li>• Wireless Technology</li> </ul> <p><b>(Back Issues from 2010)</b></p>	530,000 papers - from 100 core IEEE conference titles in POP	<p><b>Manjunath SR</b></p> <p>9870200104</p> <p>mrudrappa@ebSCO.com</p>	23-08-2021 to 22-08-2022 After this 1 month compliment.. access up to Sept. 2022
3.	<p>Springer Nature</p> <p><a href="https://link.springer.com/">https://link.springer.com/</a></p>  	Electrical & Electronics Mechanical Civil Computer Science Engineering (Allied Subject) Chemistry and Material Science Mathematics Physics	<p>Electrical &amp; Electronics - 58</p> <p>Mechanical - 44</p> <p>Civil - 13</p> <p>Computer Science - 93</p> <p>Engineering (Allied Subject) - 39</p> <p>Chemistry and Material Science - 162</p> <p>Mathematics - 167</p> <p>Physics - 104</p> <p><b>(Back Issues from 1997)</b></p>	690 Journals	<p><b>Varghese P. Thomas</b></p> <p>9686964063</p> <p>varghese.thomas@springernature.com</p> <p><b>Rajaneesh</b></p> <p>9900555516</p> <p>rajaneesh@springer.com</p>	01-04-2021 to 31-03-2022

SL NO	PUBLISHERS	SUBJECT CATEGORY	RESOURCE COVERAGE	NO. OF RESOURCES	CONTACT DETAILS	SUBSCRIPTION PERIOD
4.	<p><b>Taylor &amp; Francis</b>  <a href="https://www.tandfonline.com/">https://www.tandfonline.com/</a>    <b>Taylor &amp; Francis</b>  Taylor &amp; Francis Group</p> 	Engineering + CSE + ME + CV + Architecture and Allied Science	Allied Science-324 Mechanical-35 Textile -8 Engineering & Technology-76 Electrical-17 Computer Science-27 Civil & Structural-31 BioTechnology-17 Architecture-19  <b>(Back Issues from 2010)</b>	<b>555 Journals</b>	<p><b>Vinay Srinivas</b>  9886044775  Vinay.srinivas@tandfindia.com</p> <p><b>Onkar Verma</b>  onkar.verma@tandfindia.com  Tel: +91-11-43155118</p>	<b>01-04-2021 to 31-03-2022</b>
5.	<p><b>Emerald</b>  <a href="https://www.emeraldinsight.com/">https://www.emeraldinsight.com/</a>    <b>emerald PUBLISHING</b></p> 	Management	Accounting, Finance & Economics-9 Business, Management & Strategy-18 Education-10 Health & Social Care-5 HR, Learning & Organization Studies-17 Information & Knowledge Management-10 Library Studies-17 Marketing-12 Operations, Logistics & Quality-10 Property Management & Built Environment-5 Public Policy & Environmental Management-6 Tourism & Hospitality Management-1	<b>120 Journals</b>	<p><b>S Vinay Kumar</b>  9916252539  svkumar@emeraldgroup.com</p>	<b>01-07-2021 to 30-06-2022</b> After this 3 months compliment.. access up to August 2022
6.	<p><b>ProQuest</b>  <a href="https://www.proquest.com/165290">https://www.proquest.com/165290</a>    <b>ProQuest</b></p> 	Architecture and all Engineering and it's Allied branches.	Technology Collection includes the Advanced Technology & Aerospace and Materials Science & Engineering Databases <b>(Back issues from 1962)</b>	Fulltext: <b>3900 Journals</b>  Indexed: <b>7800 Abstract</b>	<p><b>Lakshmikanth A</b>  9886339117  Lakshmikanth.Aswathana.rayan@proquest.com</p>	<b>01-08-2021 to 31-07-2022</b>
7.	<p><b>Knimbus</b>  <a href="https://new.knimbus.com">https://new.knimbus.com</a>    <b>knimbus</b></p> 	1. Digital Library Platform 2. Remote Access Solution 3. Mobile App	All subjects 12 K + Resources and following features 1. OA resources: Journals + e-Books + e-Theses + Educational videos 2. 24 X 7 seamless access 3. Admin control for librarians 4. Usage report for individual college can take 5. Secured remote access full text content 6. Mobile compatibility	<b>E-Books: 10,000+ E-Journals: 5700+</b>	<p><b>Mohd.Tariq</b>  9625632330  mohd.tariq@knimbus.com</p> <p><b>Venkatesh</b>  8722937551  venkatesh@knimbus.com</p>	<b>01-04-2021 to 31-03-2022</b>



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8.	Turnitin* <a href="https://www.turnitin.com/">https://www.turnitin.com/</a>  	Plagiarism Originality Online Check*	End user Licenses: 1. Instructor profile 2. Student's profile	--	<b>Anub Kumar</b> 9811464814 akumar@turnitin.com	03-06-2021 to 02-06-2022
9.	NetAnalytiks <a href="https://sententia.online/">https://sententia.online/</a>  	LANQUILL (Writing Grammar Tool)	1. Admin control for librarians 2. 24 X 7 seamless access 3. Usage report for individual college can take	--	<b>Laxminarayana Ullala</b> 9620555571 laks@netanalytiks.com	01-04-2021 to 31-03-2022

**Note:** 1. \*Access given to only 140 PG program Colleges.

2. Previous years' purchased online e-Books access is continued as perpetual, in the case of McGraw-Hill e-Books subscribed up to 31.05.2023.

## The e-Yantra Embedded System and Robotics Lab:

The research platform 'The e-Yantra Embedded System Lab' has been created in collaboration with IIT Bombay, MHRD, New Delhi and National Education through Information and Communication Technologies, New Delhi to develop innovative projects.



**Technical Specification:** Firebird V 2560 with ATMEGA 2560 processor, IR proximity sensor, IR Range sensor 60X2 character LCD display, 2.4 GHz wireless Zigbee, Servomotor support.